**PATENT--FEE**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| Applicants:<br><br>**GARY L. UNDERWOOD ET AL.**<br><br>Serial No.: 09/742,663<br><br>Filed: December 21, 2000<br><br>For: **METHOD OF MAKING BACON PRODUCTS**<br><br>Attorney Docket No. 18004/36930<br><br>Group Art Unit: 1761<br><br>Examiner: Arthur L. Corbin | I hereby certify that this paper is being deposited with the United States Postal Service with sufficient postage, as first class mail, in an envelope addressed to:<br>Commissioner for Patents<br>P.O. Box 1450<br>Alexandria, VA 22313-1450<br><br>Dated: August 28, 2003<br><br>James J. Napoli<br>James J. Napoli<br>Registration No. 32,361<br>Attorney for Applicants |

**DECLARATION OF JEFFREY J. ROZUM UNDER 37 C.F.R. §1.132**

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

NOW COMES **JEFFREY J. ROZUM**, Declarant herein, and states as follows:

1. I am a co-inventor of the above-identified application.

2. I am presently employed by Red Arrow Products Co. LLC, Manitowoc, Wisconsin (Red Arrow), assignee of the above-identified patent application. My present title is Technology Development Manager. I

have been employed by Red Arrow since 1995, engaged in research and product development of food flavorants, food colorants, liquid smoke compositions, and new practical applications for such products.

3. Previous to my employment at Red Arrow, I was a research assistant at the University of Wisconsin Madison (August, 1994-December, 1995) involved in research on cooked chicken products and extending the shelf-life of cooked chicken breasts. I also was a research associate at Red Arrow Products Co. LLC (May, 1991-August, 1994) involved in research and development of food flavors and liquid smoke compositions.

4. I earned a B.Sc. degree in poultry science from the University of Wisconsin Madison (1991), and an M.S. degree in poultry science from the University of Wisconsin Madison (1995).

5. For the past seven and one-half years, I conducted research in the area of liquid smoke compositions and related flavoring and coloring compositions, including improved methods of manufacturing liquid smoke compositions. I also have been involved in developing new and improved food processing techniques utilizing such compositions. In addition, one of my standard duties at Red Arrow has been responding to customer requests and problems with respect to use of food flavoring and coloring products.

6. I have read and understand the Office Action dated May 7, 2003, which was issued in con-

nection with U.S. Patent Application Serial No. 09/742,663. I have read and understand the following patent cited by the examiner in U.S.S.N. 09/742,663: Wilson et al. U.S. Patent No. 5,997,925 ('925). I also have read and understand Olander et al. U.S. Patent No. 4,957,756 ('756), incorporated by reference into the '925 patent, and attached hereto as Exhibit A.

7. Claims 1-25 of the above-identified application were rejected as being obvious over the Wilson et al. '925 patent. In the Office Action, at page 2, the examiner states:

> "4. Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al.
>
> Wilson et al discloses slicing frozen pork bellies to a thickness of 0.6 mm, thawing to about 35°F, spraying with or immersing in an aqueous curing solution including each of applicant's claimed components in the amounts claimed (claims 6-11). The amount of curing solution pick-up by the bacon slices is 6-29%. After curing, the bacon slices are cooked."

The examiner then concludes that the present claims 1-25 would have been obvious over the disclosure of the '925 patent. Based on the difference between the present claims and the '925 patent disclosure, and the unexpected results achieved by the presently claimed invention compared to the method disclosed or suggested in Wilson et al. '925, and based on my training and experience, the present claims would not have been

obvious to a person skilled in the art after reading the '925 patent and the '756 patent cited therein.

8. The method disclosed in Wilson et al. '925 is similar to the presently claimed invention, but also has substantial and nonobvious differences. First, the Wilson et al. '925 process as described by the examiner in the Office Action is incorrect. Wilson et al. '925 does not teach first slicing pork bellies into slices, then thawing to about 35°C. To the contrary, the '925 patent teaches thawing *prior* to slicing (see column 5, lines 6-17). The presently claimed method preferably is conducted at temperatures of 0°C or less for improved processing efficiency, as recited in claims 2 and 23-25. The '925 and '756 patents provide no teaching or suggestion that would lead a person skilled in the art to process pork bellies and bacon slices at the temperatures recited in these claims.

9. Second, and very importantly, the '925 patent teaches an amount of sodium nitrite in the bacon slice that yields a finished bacon product which is unacceptable to consumers. In particular, the '925 patent teaches a cure solution containing 860 parts per million (ppm) sodium nitrite ($NaNO_2$) (column 5, lines 50-60). Wilson et al. also teach a range of sodium nitrite in the cure solution of 100 to 1500 ppm (column 6, line 2). In Example 1 of the '925 patent, bacon slices were treated with a sufficient amount of a cure composition purportedly containing 1710 ppm $NaNO_2$ such

that the bacon slices contained 120 ppm $NaNO_2$.[1] The slices then were cooked to 30% of original green weight. The cooked bacon product, therefore, had a $NaNO_2$ concentration substantially greater than 120 ppm $NaNO_2$, and up to about 400 ppm $NaNO_2$. Similarly, Example 2 utilized a cure solution containing 860 ppm $NaNO_2$ to yield bacon slices containing 120 ppm prior to cooking. See, Wilson et al. '925 patent, column 7, line 57 through column 8, line 65, especially column 8, lines 9, 14-16, 23-25, 51, 56-58, 60, and 61. Also, see claim 23 of the '925 patent.

10. Wilson et al. '925 contains no other teachings with respect to the amount of $NaNO_2$ in the cure solution, bacon slices, or cooked bacon. However, the '925 patent incorporates Olander et al. '756 by reference for a detailed description of cure solutions ('925 patent, column 5, lines 44-47). Olander et al. '756 merely teaches meat treated with a sufficient amount of a cure solution to provide uncooked meat containing 80 to 120 ppm $NaNO_2$ (column 5, line 61). The two examples in the '756 patent teach precooked meat containing 99 ppm $NaNO_2$. See '756 patent, column 5, lines 13, 31, and 61, and claims 4 and 5. Neither the '925 patent nor the '756 patent contain any teaching to suggest that the amount of $NaNO_2$ can be decreased. These patents also fail to provide any incentive to

---

[1] It should be noted that the weight percentages in Example 1 exceed 100%, so the weight amount of individual ingredients in the cure composition is in question. It appears that the 120 ppm concentration of $NaNO_2$ in the bacon slices is correct (see Example 2 of the '925 patent).

reduce the amount of $NaNO_2$ in the precooked meat below 80 ppm.

11. The presently claimed method utilizes a substantially lower amount of $NaNO_2$ and provides unexpectedly superior cooked bacon products compared to bacon products prepared by the method of Wilson et al. '925. In particular, the present invention utilizes a brine solution containing about 0.015 wt.% (150 ppm) to about 0.045 wt.% (450 ppm) $NaNO_2$, with a brine uptake of about 8 to about 15 wt.%, to provide bacon slices containing about 18 ppm to about 80 ppm $NaNO_2$. See specification, page 5, lines 17-19; page 7, lines 1-3; and page 8, line 29 through page 9, line 4.

12. I performed tests showing (a) that $NaNO_2$ is a necessary ingredient in the brine to provide a consumer-acceptable bacon product, and (b) that a low amount of $NaNO_2$ must be used in the claimed method to obtain a consumer-acceptable product. These tests were set forth in the specification in Examples 4, 5, and 8, respectively, at page 15, line 9 through page 18, line 19, and at page 21, line 5 through page 24, line 16.

13. In particular, Example 4 of the present specification shows that $NaNO_2$ is an important ingredient with respect to imparting a bacon-like appearance and flavor to the finished bacon product. Examples 5 and 8 show that the amount of $NaNO_2$ also is very important with respect to providing a consumer-acceptable bacon product.

14. I performed Example 5 of the specification to determine the amount of sodium nitrite suitable to achieve a desired brown color and flavor based on a desired brine solution uptake of about 8 wt.%. to about 15 wt.%. In particular, eight brine solutions were prepared having various concentrations of sodium nitrite. Each brine solution contained about 15 wt.% sodium chloride, based on the total weight of the solution, and about 6 wt.% smoke flavoring, based on the total weight of the solution. Each brine solution also contained a different amount of sodium nitrite, as follows (expressed as a weight percent based on the total weight of the solution): 0, 0.019, 0.028, 0.038, 0.047, 0.094, 0.152, and 0.190. Side pork was sliced to a thickness of about 1 mm to about 2 mm, then the slices were dipped into one of the various brine solutions for about fifteen seconds, and allowed to drip for about fifteen seconds. Next, the strips were heated in a conventional household microwave oven until about a 30-35% yield was achieved.

15. From the test performed as set forth in paragraph 14,, and based on an 8 wt.% uptake of brine solution by the bacon strips, the following is the calculated amount of $NaNO_2$ in the bacon strips prior to cooking:

| Brine Solution (wt.% $NaNO_2$) | Brine Solution (wt.% $NaNO_2$) | Bacon Slices Before Cooking (ppm $NaNO_2$)[1)] |
|---|---|---|
| 0 | 0 | 0 |
| 0.019 | 190 | 15.2 |
| 0.028 | 280 | 22.4 |
| 0.038 | 380 | 30.4 |
| 0.047 | 470 | 37.6 |
| 0.094 | 940 | 75.2 |
| 0.152 | 1520 | 121.6 |
| 0.190 | 1900 | 152.0 |

1) Based on 8 wt.% brine uptake.

16. Visual inspection of cooked bacon products resulting from the treated bacon slices of paragraph 14 by a consumer panel concluded that unacceptable bacon products result from bacon slices incorporating 121.6 ppm $NaNO_2$. Bacon products containing 75.2 ppm $NaNO_2$ were consumer acceptable. The consumer panel determined that a level of about 0.019 wt.% to about 0.028 wt.% $NaNO_2$ provided an excellent cured color in the finished bacon product. The panel also determined that at a sodium nitrite level significantly above about 0.094 wt.% (i.e., 121.6 ppm $NaNO_2$) resulted in an unacceptably red finished bacon product.

17. The test described in paragraph 14, the calculations in paragraph 15, and the visual inspections in paragraph 16, show that acceptable bacon products result from incorporating 75.2 ppm $NaNO_2$ into the bacon slices. Bacon products containing 121.6 ppm $NaNO_2$ were unacceptable. These results are both surprising and unexpected based on the teachings of Wilson et al. '925, which teaches using a minimum amount of $NaNO_2$ that is about 50% greater than the presently

claimed maximum amount of $NaNO_2$ in the uncooked, bacon slices.

18. In addition, the present method provides an additional benefit over the '925 and '756 patents. The reduced amount of $NaNO_2$ not only provides a consumer acceptable bacon product, but also increases product safety. A long-felt need in the art has been a bacon product that contains a reduced amount of $NaNO_2$. The 120 ppm $NaNO_2$ value is a regulatory maximum, and any decrease in $NaNO_2$ content would be an important feature for processors and consumers because reducing the amount of $NaNO_2$ in the bacon slices also reduces the formation of carcinogenic N-nitrosamines that arise during cooking from a reaction between $NaNO_2$ and certain amines naturally present in pork bellies. This goal has not been achieved until the method of the present invention.

19. I also performed Example 8 of the specification to determine the amount of sodium nitrite in a bacon slice prior to cooking that is needed to provide consumer-acceptable food products prepared by the present method. In these tests, side pork first was sliced into strips about one to about two millimeters in thickness. The slices then were laid flat on a cookie sheet and frozen. The following brine solutions (a) through (f) were prepared independently:

| Solution | Water (g) | Salt[1)] (g) | Trisodium Phosphate (g) | P50[2)] (g) | Sodium Nitrite (g) |
|---|---|---|---|---|---|
| (a) | 210 | 40 | 1.35 | 10 | 0 |
| (b) | 210 | 40 | 1.35 | 10 | 0.05 |
| (c) | 210 | 40 | 1.35 | 10 | 0.10 |
| (d) | 210 | 40 | 1.35 | 10 | 0.20 |
| (e) | 210 | 40 | 1.35 | 10 | 0.30 |
| (f) | 210 | 40 | 1.35 | 10 | 0.35 |

1) sodium chloride, and

2) AROSMOKE P50® liquid smoke.

Solutions (a)-(f) were prepared by first adding the trisodium polyphosphate to the warm water, and mixing the resulting mixture until the trisodium phosphate was dissolved. Then, the salt was added to the resulting solution, and the resulting mixture was mixed until the salt was completely dissolved. The liquid smoke then was mixed into the resulting solution. Just prior to using the resulting brine, a desired, predetermined amount of sodium nitrite was added to individual solutions, and the resulting mixture was stirred until the sodium nitrite was completely dissolved. The pork slices then were removed from the freezer and allowed to warm to up a point such that the cold slices could be bent without breaking. The pork slices then were immersed into one of brine solutions (a) through (f) for 30 seconds, removed from the solution, and allowed to drip dry for approximately 30 seconds. The solution-treated slices were placed on a paper plate, then into a microwave oven. The slices were cooked for about 2 to 2 1/2 minutes to achieve a 35-45% yield of cooked bacon product. The resulting bacon product then

was allowed to cool at room temperature prior to analysis for generation of a red color.

20. A Minolta CR300 with a Minolta Data Processor DP301 (Minolta Corporation, Ramsey, New Jersey) was used to analyze for color formation by measuring L*a*b color values of the cooked bacon products. Four replicate readings were taken for each bacon strip for each test parameter. The four readings then were analyzed statistically to provide a mean and a standard deviation for each set of data. The "a" value of the measurement was analyzed in detail because the "a" value provides data in the green (-a values) to red (+a values) color quadrant. As known to persons skilled in the art, when the "a" value increases, the red color of the cooked bacon product also increases. The mean "a" values were graphed versus the corresponding nitrite level (in ppm) of the uncooked bacon slice in the graph of Exhibit B. From Exhibit B, and from taste testing, a control bacon product (0 ppm nitrite in the bacon slice) exhibited a cooked pork taste and color (i.e., essentially colorless "a" value of less than 8) as opposed to a cooked bacon product taste and color. However, at 18 ppm sodium nitrite in the bacon slice, a cooked bacon product prepared in accordance with the present invention provided the recognized and well-known taste and color of cooked commercial bacon.

21. In addition, slices of commercial bacon, namely samples of Oscar Mayer, Hillshire Farms, and Patrick Cudahy bacon, were purchased at a supermarket. Two slices of raw bacon from each package were cooked

as described above for the test slices. The commercial cooked bacon also was measured for the generation of a red color as described above. The mean "a" value was 13.15 for the Oscar Mayer product, 14.86 for the Hillshire Farms product, and 10.03 for the Patrick Cudahy product. All these commercial bacon products were consumer acceptable. Each commercial bacon, before cooking, had a sodium nitrite content of at least 120 ppm.[2] Correlating these values to Exhibit B shows that a consumer-acceptable bacon made by the present method contains an unexpectedly low amount of about 18 up to about 80 ppm sodium nitrite prior to cooking.

22. In particular, Exhibit B shows that a cooked bacon slices having a sodium nitrite level of about 18 ppm exhibits an "a" value for the cooked bacon of about 10.75, and a nitrite level of 87 ppm exhibits an "a" value of about 15. Accordingly, a consumer-acceptable bacon product manufactured by the present method has an "a" value of about 10 to about 15. For an "a" value below 10, the bacon product has a commercially unacceptable low pale color. For an "a" value above 15, the bacon product has a commercially unacceptable high red color. In commercially preferred

---

[2] It must be understood that the commercial bacons are prepared by a method different from the presently claimed method. The tested commercial bacons are prepared by injecting a cure solution into the green bacon belly *prior* to slicing. Hence, the commercial bacons, before cooking, contain 120 ppm $NaNO_2$ and provide a consumer-acceptable product. The method of Wilson et al. '925 is similar to the present method and applies the cure solution after slicing. At 120 ppm $NaNO_2$, a consumer-acceptable bacon is not achieved.

products, the "a" value of a cooked bacon product produced by the present invention is about 11 to about 14, and in more preferred products the "a" value is about 12 to about 13. Exhibit C contains color photographs showing the unacceptable color generated at 0, 85, and 127 ppm $NaNO_2$, and the acceptable color generated at 18, 36, and 51 ppm.

23. All statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; further, these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Jeffrey J. Rozum

Date: August 26, 2003

EXHIBIT B



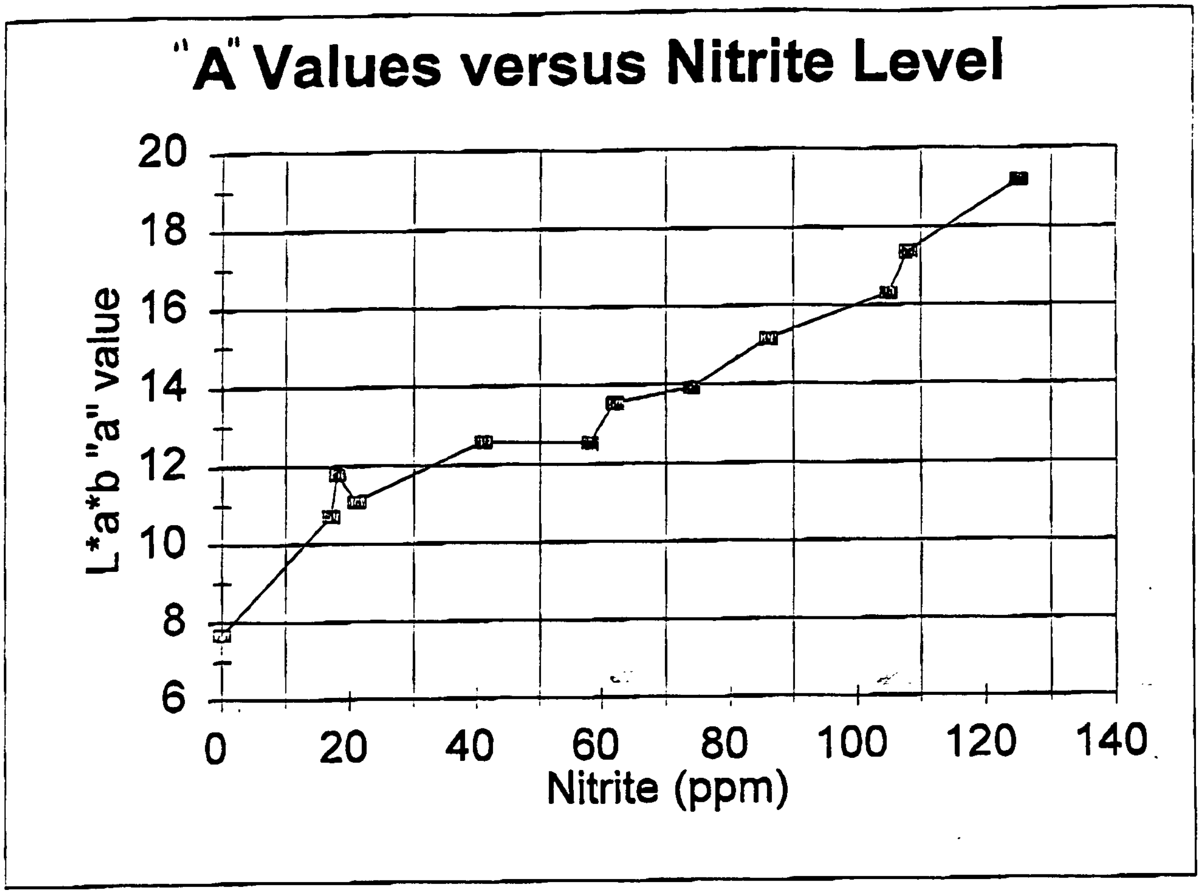
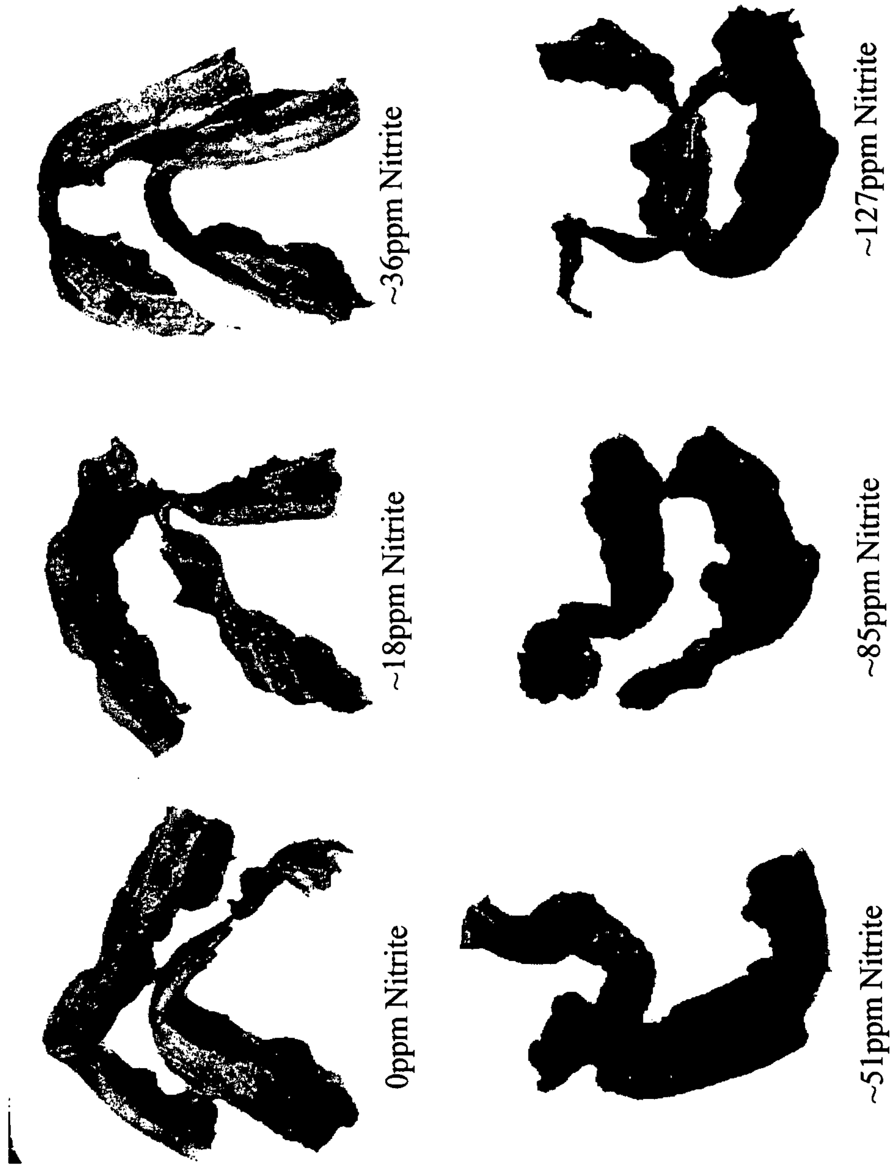



Fig. 1


0ppm Nitrite
~18ppm Nitrite
~36ppm Nitrite
~51ppm Nitrite
~85ppm Nitrite
~127ppm Nitrite